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LSI® Nytro™ WarpDrive® Application Acceleration Cards

User Guide

Version 1.9
June 2013

DB15-000652-12

Revision History

Version and Date	Description of Changes
Version 1.9, June 2013	Updated Table 1.Updated product information throughout the document.
Version 1.8, May 2013	Updated Table 1.
Version 1.7, January 2013.	Added notes in Section 2.2.2.
Version 1.6, September 2012	Added information for the LSI Nytro WarpDrive 6301 product. Added Sections 2.2.2 and 3.3. Updated Table 1.
Version 1.5, May 2012	Updated the product name from LSI WarpDrive Solid State Storage Acceleration card to LSI Nytro WarpDrive Application Acceleration card. Updated Table 2, and Section 3.6. Added Section 2.2.3.
Version 1.4, January 2012	Revised the product information throughout the document.
Version 1.3, September 2011	Changed the installation information.
Version 1.2, August 2011	Added new information for the LSI Nytro WarpDrive 6203 product and reorganized the document by product.
Version 1.1, May 2011	Added new product information.
Version 1.0, September 2010	Initial release of this LSI Nytro WarpDrive User Guide.

Electromagnetic Compatibility Notices

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables for SCSI connection external to the cabinet are used in the compliance testing of this Product. LSI Logic is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by LSI Logic. The correction of interferences caused by such unauthorized modification, substitution, or attachment will be the responsibility of the user.

The LSI Nytro WarpDrive Application Acceleration Card is tested to comply with FCC standards for home or office use.

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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Chapter 1: Introduction

1.1 Overview

The LSI® Nytro™ WarpDrive® Acceleration Application cards are block storage devices. The cards present themselves to the operating system through a Fusion-MPT™ interface as single or multiple drives that require minimal user configuration. You can use these cards for either nonpersistent (for example, cache) or persistent (for example, database files) data.

The LSI Nytro WarpDrive cards have Flash ROM for storing the BIOS and firmware, and NVRAM for storing nonvolatile user data. The cards have three LEDs on the PCI bracket to indicate activity, drive life, and status.

The LSI Nytro WarpDrive cards have a PCI Express® (PCIe®) interface that complies with the *PCI Express Specification 2.0* or *PCI Express Specification 3.0*.

The functionality of the LSI Nytro WarpDrive cards comes from a SAS2008 or SAS2308 I/O controller with LSI Nytro WarpDrive firmware that runs on the internal processor.

1.2 Related Documents

Refer to the following documents for more information on the LSI Nytro WarpDrive card and related tools.

- *LSI® Nytro™ WarpDrive® Application Acceleration Card r10.00.00.00 Release Notes*
- *LSI® Nytro™ WarpDrive® Application Acceleration Card Management Utility User Guide*
- *LSI® Nytro™ WarpDrive® Application Acceleration Card Quick Installation Guide*
- *LSI® Nytro™ WarpDrive® 6301 Application Acceleration Card Quick Installation Guide*
- *LSI® Nytro™ MegaRAID® Application Acceleration Card Software User Guide*

1.3 Features

This section lists the features of the LSI Nytro WarpDrive cards.

- Proven enterprise firmware stack
- Best-in-class read and write performance
- Average latency of less than 50 ms
- Low host burden – No static CPU and memory overhead
- Support for Windows® and Linux® operating systems
- Support for VMware® and FreeBSD® operating systems
- Bootable
- PCIe 2.0, x8 (for the LSI Nytro WarpDrive 6203 card)
- PCIe 3.0 x 8 (for the LSI Nytro WarpDrive 6301 card)
- Profile and form factor varies
- PCIe standard or low-profile bracket
- LEDs for data activity, drive life, and drive status

High reliability includes block-level, page-level, and die-level failure protection.

Chapter 2: Installation

2.1 Quick Installation Instructions

Use the quick installation instructions to install your LSI Nytro WarpDrive card if you are comfortable with the installation procedure. See the next section if you need more detailed installation instructions.

To quickly install your LSI Nytro WarpDrive card, follow these instructions.

1. Unpack the LSI Nytro WarpDrive card and inspect it for damage.
2. Turn off the server, and remove the power cord.
3. Remove the cover from the server.
4. Insert the card in an available PCIe slot.
5. Secure the bracket to the system's chassis.
6. Replace the cover and the power cord, then turn on the server.

The LSI Nytro WarpDrive card hardware installation is complete.

2.2 Detailed Installation Instructions

2.2.1 Hardware Installation for the LSI Nytro WarpDrive 6203 Card

1. **Unpack the LSI Nytro WarpDrive card and inspect it for damage.** Unpack the card in a static-free environment and follow good antistatic grounding procedures. Remove the LSI Nytro WarpDrive card from the antistatic bag, and carefully inspect it for damage. If you notice any damage, contact LSI, or your reseller support representative.

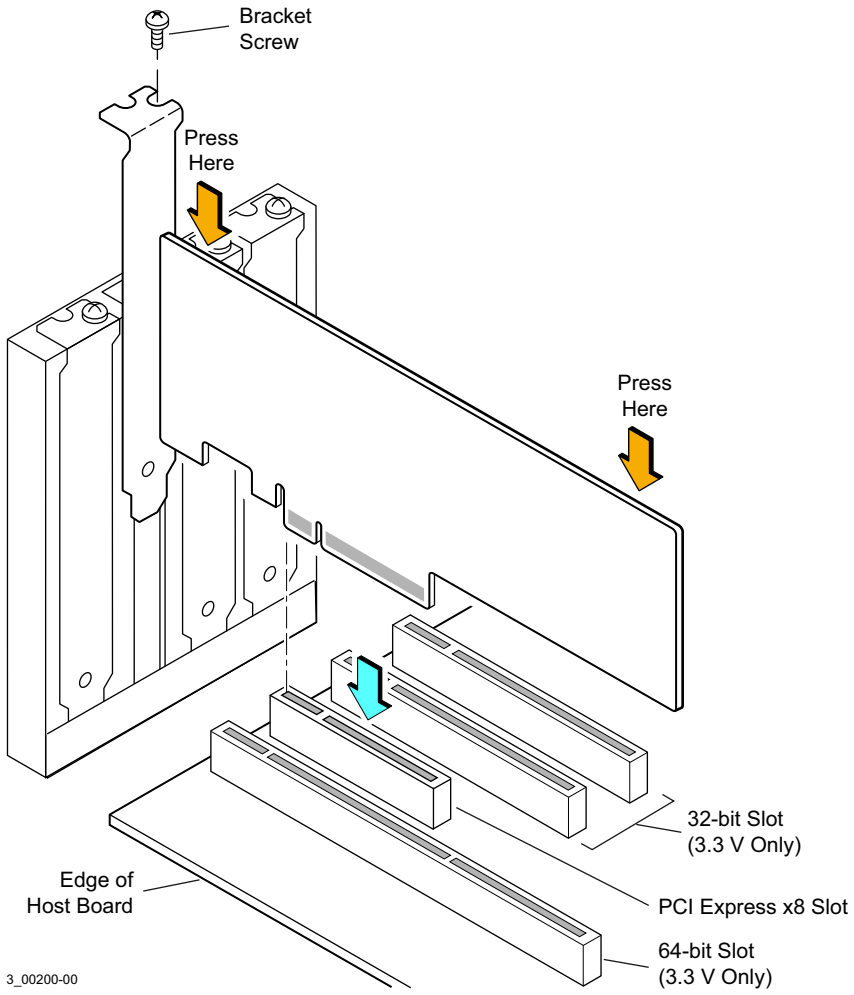
   NOTE Back up your data before changing your system configuration.

2. **Prepare the computer.** Turn off the server, and disconnect the power cords from the power supply. Remove the cover from the chassis.

   WARNING To avoid electrical shock, disconnect the server from the main power and from any networks before you install the card.

3. **Replace the PCI mounting bracket (system dependent).** If required for your system, replace the shorter PCI mounting bracket that ships on the LSI Nytro WarpDrive card with the full-height bracket supplied. Save the two screws from the short bracket and use the screws to attach the full-height bracket.
4. **Insert the LSI Nytro WarpDrive card in an available PCIe slot.** Locate an empty PCIe slot. Remove the blank bracket panel on the server chassis that aligns with the empty PCIe slot. Save the bracket screw, if applicable. Align the card to the PCIe slot. Press down gently, but firmly, to properly seat the card in the slot. The following figure shows how to insert the card in a PCIe slot.

Figure 1 Card Installation for the LSI Nytro WarpDrive 6203 Cards



NOTE The shape, size, and locations of components on your LSI Nytro WarpDrive card might vary from this illustration.

5. For highest performance, make sure that the PCIe slot is PCIe 2.0 and make sure that it has an active width of eight lanes or sixteen lanes. The LSI Nytro WarpDrive card functions with an active width of four lanes or two lanes, but with reduced performance.

CAUTION The location must meet the 300 LFPM (linear feet/minute) minimum airflow requirement.

6. **Secure the bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the card to the system's chassis.
7. **Replace the cover, reconnect the power cords, and power up the system.** Replace the server's cover, reconnect the power cords, and reconnect any network cables. Turn on the power.

The LSI Nytro WarpDrive card hardware installation is complete.

2.2.2 Hardware Installation for the LSI Nytro WarpDrive 6301 Card

1. **Unpack the LSI Nytro WarpDrive card and inspect it for damage.** Unpack the card in a static-free environment and follow good antistatic grounding procedures. Remove the LSI Nytro WarpDrive card from the antistatic bag, and carefully inspect it for damage. If you notice any damage, contact LSI, or your reseller support representative.

   NOTE Back up your data before changing your system configuration.

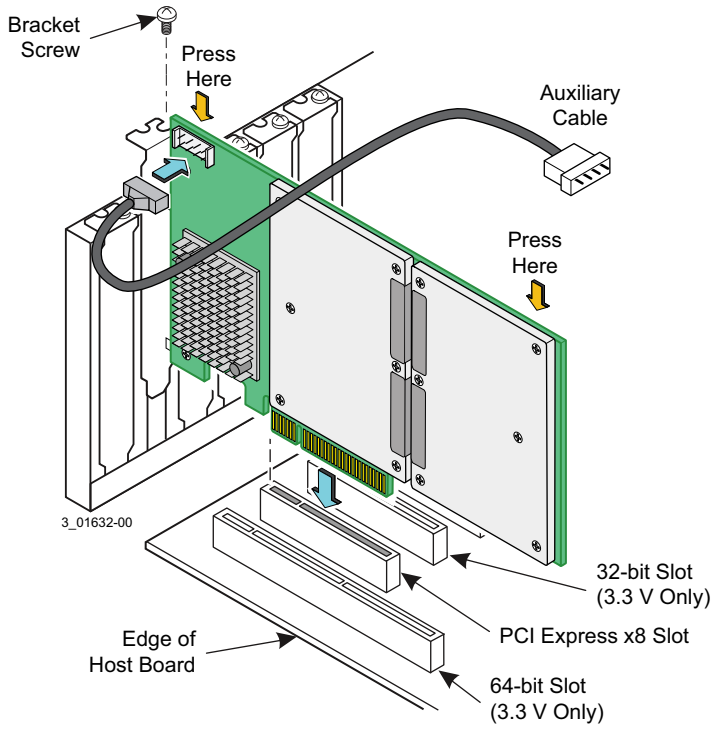
2. **Prepare the computer.** Turn off the server, and disconnect the power cords from the power supply. Remove the cover from the chassis.

   WARNING To avoid electrical shock, disconnect the server from the main power and from any networks before you install the card.

3. **Insert the LSI Nytro WarpDrive card in an available PCIe slot.** Locate an empty PCIe slot. Remove the blank bracket panel on the server chassis that aligns with the empty PCIe slot. Save the bracket screw, if applicable. Align the card to the PCIe slot. Press down gently, but firmly, to properly seat the card in the slot. The following figure shows how to insert the card in a PCIe slot.

   NOTE Make sure that the PCIe slot is capable of providing 75 W of power. Otherwise, install the auxiliary power cable shown in the following figure.

Figure 2 Card Installation for the LSI Nytro WarpDrive 6301 Card



NOTE The shape, size, and locations of components on your LSI Nytro WarpDrive card might vary from this illustration.

4. For highest performance, make sure that the PCIe slot is PCIe 3.0 and make sure that it has an active width of eight lanes or sixteen lanes. The LSI Nytro WarpDrive card functions with an active width of four lanes or two lanes, but with reduced performance.

CAUTION The location must meet the 300 LFPM (linear feet/minute) minimum airflow requirement.

5. **Secure the bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the card to the system's chassis.
6. **Replace the cover, reconnect the power cords, and power up the system.** Replace the server's cover, reconnect the power cords, and reconnect any network cables. Turn on the power.

The LSI Nytro WarpDrive card hardware installation is complete.

NOTE Do not ship the LSI Nytro WarpDrive card inside a server without first gaining approval from LSI.

2.2.3 New Windows Driver Installation

The LSI drivers for Windows Server® 2003 (x86, x64, or IA64), Windows Server 2008 (x86, x64, or IA64), Windows XP, Windows Vista®, and Windows 7 are available online at the link listed in step 1.

To load the LSI driver during a new Windows system installation, you can boot directly from the Microsoft® installation CD-ROM.

To install a new Windows operating system and its appropriate device driver, follow these steps:

1. Follow the links on the LSI USB drive to download the Windows driver from the LSI website at http://www.lsi.com/support/Pages/Download-Search.aspx.
2. Copy the appropriate driver files onto a disk.
3. Open the file and follow the directions in the `lsi_sss_[OperatingSystemName].txt` file.

2.2.4 Existing Windows Driver Installation

The following steps contain a sample driver installation for Windows Server 2003. Additional versions of Windows drivers are available online. Consult the `ReadMe.txt` file for each driver. To open the readme file, click the plus sign next to the title of the driver. For LSI downloads, go to:

http://www.lsi.com/support/Pages/Download-Search.aspx

The LSI drivers for Windows Server 2003 (x86, x64, or IA64) and Windows Server 2008 (x86, x64, or IA64) are available online. Use the following procedure to install or upgrade the LSI_SSS.SYS driver onto an existing Windows Server 2003 system.

NOTE When an LSI SAS Gen2 adapter is added to an existing system installation, the new adapter is automatically detected at the next reboot. When the Device Driver Wizard appears at boot, click on the **Next** button and continue with step 8.

1. Boot Windows Server 2003 and log on as a user with Administrator privileges.
2. Click the **Start** button, then right-click the **My Computer** entry in the menu.
3. Click the **Properties** selection.
4. Click the **Hardware** tab, then click the **Device Manager** button.
5. Click the **+** to the left of the SCSI and RAID controllers line. Find the adapter desired for the driver upgrade and double-click the entry. Click on the **Driver** tab.

6. Information on the currently installed driver is displayed, and you can view additional driver details by clicking the **Driver Details** button.
7. Click the **Update Driver** button to update the existing driver. The Hardware Update Wizard begins.
8. Click the **Install from a list or specific location** button to select it, then click the **Next** button.
9. Click the **Don't search, I will choose the driver to install** button to select it, then click the **Next** button.
10. Click the **Have Disk** button and type the path to the driver, or click the **Browse** button. Select the location for the driver package that matches the processor architecture of the system (x86, IA64, or x64). After the path to the driver has been established, click the **OK** button.
11. Select the driver from the list and click the **Next** button.
12. Click the **Next** button again to start the driver update. In some cases, a message displays indicating that this driver has not passed logo testing. This message informs you that a nonsigned driver is being installed.

    NOTE Drivers are digitally signed by the Microsoft Windows Hardware Quality Lab (WHQL) on completion of logo testing. Because of the time lag between the general customer release by LSI of Windows drivers and the completion of WHQL logo testing, some drivers distributed with adapters or downloaded from the www.lsi.com website might not be digitally signed.

13. Click the **STOP Installation** button to cancel the installation if a nonsigned driver is not desired. You will not be able to install the LSI Nytro WarpDrive card.
    or
    Click the **Continue Anyway** button to continue the installation.

    The system loads the driver. A message box might display that indicates that the target (existing) driver is newer than the source (upgrade) driver.
14. Click **No** to cancel the driver upgrade at this point.
    or
    Click **Yes** to continue the installation.

    The system copies the driver to the system disk. For any adapter other than the boot adapter, the updated driver becomes active immediately. For the boot adapter, a message box displays that indicates that you must reboot your system for the new driver to take effect.
15. Click the **Finish** button to complete the driver upgrade.

Download the latest Windows drivers from the LSI website. Consult the `ReadMe.txt` file available online with the driver if more detail is needed. To open the readme file, click the plus sign next to the title of the driver.

2.2.5 Linux Driver Installation

Download the latest Linux drivers from LSI website. Consult the `Linux ReadMe.txt` file available online with the driver. To open the readme file, click the plus sign next to the title of the driver. For LSI downloads, go to:

http://www.lsi.com/support/Pages/Download-Search.aspx

LSI provides open source drivers in the following ways:

- Precompiled binaries to add to an existing installation using driver update disks or RPMs for selected distributions.
- Fusion-MPT source to add or update any distribution.

2.2.6 FreeBSD Driver Installation

Download the latest FreeBSD drivers from the LSI website. Consult the `FreeBSDReadMe.txt` file available online with the driver. To open the readme file, click the plus sign next to the title of the driver. For LSI downloads, go to:

http://www.lsi.com/support/Pages/Download-Search.aspx

LSI provides open source drivers in the following way:

- Precompiled binaries to add to a supported installation using pre-compiled `.ko` files.

2.2.7 VMware Driver Installation

2.2.7.1 VMware ESX4.1

Download the latest VMware ESX4.1 driver from the LSI website at www.lsi.com/products/storagecomponents/Pages/NytroWarpDrive.aspx.

2.2.7.2 VMware ESX5.0/ESX 5.1

Use the following steps to download the latest VMware ESX5.0 or ESX 5.1 driver from the VMware website:

1. Go to this website http://www.vmware.com/resources/compatibility/search.php?deviceCategory=io.
2. Search for the device with the vendor ID (VID) 1000 and the device ID (DID) 007E.
3. Click on your Nytro WarpDrive model link from the search result.
4. Copy the information string under Device Driver(s).
5. Go to this website https://my.vmware.com/web/vmware/downloads to download the driver.
6. Enter the information string in the search box.
7. Click on the topmost link of the search results.
8. After you download the driver zip file, refer to the *readme.txt* file for all installation instructions.

2.3 BIOS Boot Support Settings

The LSI Nytro WarpDrive BIOS permits you to change the card properties. You can specify that the card is eligible for LSI software control or that the card is reserved for control by software that does not belong to LSI. You can select from the following settings in the Boot Support feature of the BIOS:

Enabled BIOS and OS permits the BIOS and the operating system driver to control the card.

Enabled BIOS Only permits the BIOS to control the card. The operating system driver does not control the card. Some operating system drivers (such as Windows drivers) do not support this option.

Enabled OS Only permits the operating system to control the card. The BIOS does not control the card with this setting.

Disabled prevents the BIOS from controlling the card when the card is loaded in the server. However, you can still see the card when you use the configuration protocol. You can use this option when you have multiple cards in your system and you do not plan to boot from this card.

Changes to these settings display in the Status field on the main Adapter List menu. The new setting takes effect when the BIOS reloads when you reboot the system.

2.3.1 Changing the BIOS Settings

To change the BIOS settings, follow these instructions:

1. At power-on, press Ctrl-C to log on to the BIOS screen.

Figure 3 The BIOS Screen

LSI Corp Config Utility v110.00.00.00 (2013.05.20)
Adapter List Global Properties
Adapter PCI Bus PCI Dev PCI Fnc PCI Slot FW Revision Status Boot Order
NWD-BLP4-1600 05 00 00 06 110.00.00.00 Enabled 0
Esc = Exit Menu F1/Shift+1 = Help
Alt+N = Global Properties -/+ = Alter Boot Order Ins/Del = Alter Boot List

2. Press **Enter** to go to **Adapter Properties**.

Figure 4 The Adapter Properties Screen

3. To toggle between the **Boot Support** settings, use the **-/+/ Enter** keys.

Figure 5 The Disabled Boot Support Setting

4. Press **Esc** to exit the BIOS menu.

2.4 Managing the LSI Nytro WarpDrive Card

You can use the following tools to manage your LSI Nytro WarpDrive card:

BIOS This tool is available only during boot. Use this tool to view information about the card and to configure the boot support options. See BIOS Boot Support Settings.

DDCLI This menu-driven, command line interface tool permits you to view information, view the status, and flash upgrade the firmware for the LSI Nytro WarpDrive card. Refer to the *LSI® Nytro™ WarpDrive® Application Acceleration Card Management Utility User Guide*.

MegaRAID Storage Manager This GUI tool permits you to manage LSI MegaRAID controllers, but you can also use the MegaRAID Storage Manager™ tool to view LSI Nytro WarpDrive card information. Refer to the *LSI® Nytro™ MegaRAID® Application Acceleration Card Software User Guide*.

Chapter 3: Characteristics

3.1 LSI Nytro WarpDrive Card General Characteristics

The LSI Nytro WarpDrive cards contain Flash ROM for storing the BIOS and firmware. Three LEDs are located on the PCI bracket to indicate activity, drive life, and status.

The following table shows the characteristics of each LSI Nytro WarpDrive card model.

Table 1 LSI Nytro WarpDrive Card Characteristics Summary

Device Name	Model Name	Capacity	Connector	Part Number	Flash Controller	NAND Type	Card Style	Controller
LSI Nytro WarpDrive 6203	NWD-WLP4-200	200 GB	X8 PCIe 2.0	L3-25475-xxx	SF 2500	SLC (single-level cell)	HHHL (Half-Height Half-Length)	SAS2008
LSI Nytro WarpDrive 6203	NWD-WLP4-400	400 GB	X8 PCIe 2.0	L3-25507-xxx	SF 2500	SLC	HHHL	SAS2008
LSI Nytro WarpDrive 6203	NWD-BLP4-400	400 GB	X8 PCIe 2.0	L3-25456-xxx	SF 2500	MLC (multi-level cell)	HHHL	SAS2008
LSI Nytro WarpDrive 6203	NWD-BLP4-800	800 GB	X8 PCIe 2.0	L3-25479-xxx	SF 2500	MLC	HHHL	SAS2008
LSI Nytro WarpDrive 6203	NWD-BLP4-1600	1600 GB	X8 PCIe 2.0	L3-25509-xxx	SF 2500	MLC	HHHL	SAS2008
LSI Nytro WarpDrive 6301	NWD-BFH8-3200	3200 GB	X8 PCIe 3.0	H3-25455-xxx	SF 2500	MLC	Full Height	SAS2308

3.2 LSI Nytro WarpDrive 6203 Card Physical Characteristics

The LSI Nytro WarpDrive 6203 card uses a low-profile, half-height, and half-length PCIe board.

The LSI Nytro WarpDrive 6203 card uses a SAS2008 controller with drive firmware that runs on its internal processor. The controller connects to up to four embedded nonvolatile memory modules. The LSI Nytro WarpDrive 6203 card can be used for either persistent or nonpersistent data and offers high-performance with low latency and a low CPU burden.

The following figure shows the LSI Nytro WarpDrive 6203 card.

Figure 6 LSI Nytro WarpDrive 6203 Card

3.2.1 LEDs

Three board-mounted, right-angle LEDs shine through holes in the PCI bracket: one is for data activity, one is for drive life, and one is for drive status. The LEDs are labeled on the bracket.

3.2.2 Troubleshooting the LSI Nytro WarpDrive Card

The LEDs provide key status information to diagnose any problem with the LSI Nytro WarpDrive card. You can also contact Technical Support. The following figure shows the LED layout.

Figure 7 LSI Nytro WarpDrive 6203 Card LED Diagram

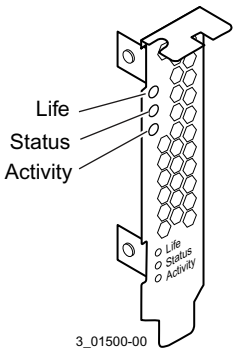


Table 2 Status Indicators on a Running System

Name	Color	LED Description
Activity	Green	On, blinking – Indicates data activity on the card. No action required.
Life	Green	On, steady – Card has sufficient life remaining for programming and erasing the Flash memory. No action required.
	Yellow	On, steady – Card has approximately 10% or less of life remaining for programming and erasing the Flash memory. Plan for replacements.
	Red	On, steady – Card has no program or erase cycles left. Data can be read, but writes are at risk. Back up data and copy to a new LSI Nytro WarpDrive card.
Status	Green	On, steady – Normal.
		On, blinking – Lets the user locate a specific LSI Nytro WarpDrive card in a rack of servers.
	Yellow	On, steady – Warning. One of the following conditions applies: ■ Temperature warning. If this condition persists, you might damage your LSI Nytro WarpDrive card. Increase cooling for the card or shut down your system to prevent damage. ■ Other component issues: Run the list and health commands in the `ddcli` utility to determine which component has an issue.
	Red	On, blinking – Firmware fault code: ■ Run the `ddcli` utility to determine which component has an issue. ■ If no information appears, reboot the system and retry. ■ If no information appears, contact Technical Support.
		On, steady – One of the following conditions applies: ■ One or more SSDs failed (IT mode). ■ At least one SSD has exceeded its temperature. ■ Failed RAID volume (DD mode). ■ No RAID volume is configured (DD mode). ■ Backup power store failed. ■ Other component issues: Run the list and health commands in the `ddcli` utility to determine which component has an issue. If no information appears, reboot the system and retry the utility (DD mode).

If you experience a problem with your LSI Nytro WarpDrive 6203 card that you cannot resolve, report it to your FAE or, if you obtained the product from an OEM, report it to the OEM. Keep these tips in mind when reporting a problem:

- Clearly identify and report the revision level of the LSI Nytro WarpDrive 6203 card. To view this information, use the `ddcli` command, Option 1.
- Report the part number (for example, L3-25475-xxx) listed on the label, and clearly identify the board revision.
- Describe the steps leading up to the error.
- Report the operating system version and the host driver version.

3.3 LSI Nytro WarpDrive 6301 Card Physical Characteristics

The LSI Nytro WarpDrive 6301 card uses a full-height PCIe board.

The LSI Nytro WarpDrive 6301card uses a SAS2308 controller with drive firmware that runs on its internal processor. The controller connects to up to eight embedded nonvolatile memory modules. The LSI Nytro WarpDrive 6301 card can be used for either persistent or nonpersistent data and offers high-performance with low latency and a low CPU burden.

The following figure shows the LSI Nytro WarpDrive 6301 card.

Figure 8 LSI Nytro WarpDrive 6301 Card

3.3.1 Shipping

You must always ship the LSI Nytro WarpDrive 6301 card separately from its intended target servers. Do not ship a server with the LSI Nytro WarpDrive 6301 card installed.

3.3.2 LEDs

Three board-mounted, right-angle LEDs shine through holes in the PCI bracket: one is for data activity, one is for drive life, and one is for drive status. The LEDs are labeled on the bracket.

3.3.3 Troubleshooting the LSI Nytro WarpDrive Card

The LEDs provide key status information to diagnose any problem with the LSI Nytro WarpDrive card. You can also contact Technical Support. The following figure shows the LED layout.

Figure 9 LSI Nytro WarpDrive Card LED Diagram

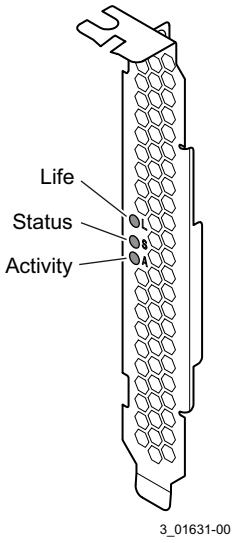


Table 3 Status Indicators on a Running System

Name	Color	LED Description
Activity	Green	On, blinking – Indicates data activity on the card. No action required.
Life	Green	On, steady – Card has sufficient life remaining for programming and erasing the Flash memory. No action required.
	Yellow	On, steady – Card has approximately 10% or less of life remaining for programming and erasing the Flash memory. Plan for replacements.
	Red	On, steady – Card has no program or erase cycles left. Data can be read, but writes are at risk. Back up data and copy to a new LSI Nytro WarpDrive card.

Table 3 Status Indicators on a Running System (Continued)

Name	Color	LED Description
Status	Green	On, steady – Normal.
		On, blinking – Lets the user locate a specific LSI Nytro WarpDrive card in a rack of servers.
	Yellow	On, steady – Warning. One of the following conditions applies: ■ Temperature warning. If this condition persists, you might damage your LSI Nytro WarpDrive card. Increase cooling for the card or shut down your system to prevent damage. ■ Other component issues: Run the list and health commands in the `ddcli` utility to determine which component has an issue.
	Red	On, blinking – Firmware fault code: ■ Run the `ddcli` utility to determine which component has an issue. ■ If no information appears, reboot the system and retry. ■ If no information appears, contact Technical Support.
		On, steady – One of the following conditions applies: ■ One or more SSDs failed (IT mode). ■ At least one SSD has exceeded its temperature. ■ Failed RAID volume (DD mode). ■ No RAID volume is configured (DD mode). ■ Backup power store failed. ■ Other component issues: Run the list and health commands in the `ddcli` utility to determine which component has an issue. If no information appears, reboot the system and retry the utility (DD mode).

If you experience a problem with your LSI Nytro WarpDrive 6301 card that you cannot resolve, report it to your FAE or, if you obtained the product from an OEM, report it to the OEM. Keep these tips in mind when reporting a problem:

- Clearly identify and report the revision level of the LSI Nytro WarpDrive 6301 card. To view this information, use the `ddcli` command, Option 1.
- Report the part number (for example, H3-25455-xxx) listed on the label, and clearly identify the board revision.
- Describe the steps leading up to the error.
- Report the operating system version and the host driver version.

3.4 Electrical and Environmental Specifications

The LSI Nytro WarpDrive card is designed to minimize electromagnetic emissions, susceptibility to radio frequency energy, and the effects of electrostatic discharge. The card carries the CE mark, C-Tick mark, Canadian Compliance Statement, KCC, HF, Taiwan BSMI, Japan VCCI, and FCC Class B, and the card is marked with the FCC Self-Certification logo. The card also meets the requirements of CISPR Class B.

3.5 Electrical Characteristics

The LSI Nytro WarpDrive 6203 card receives power from the PCIe 12-V and 3.3-V power rails.

The LSI Nytro WarpDrive 6301 card receives power from the PCIe 12-V power rail or auxiliary cable.

3.6 Thermal and Atmospheric Characteristics

The LSI Nytro WarpDrive design operates in an environment defined by the following parameters.

- Temperature range: 5 °C to 45 °C (dry bulb)
- Relative humidity range: 8 percent to 80 percent noncondensing
- Maximum wet bulb temperature: 28 °C
- Airflow requirement: more than 300 LFPM

  In accordance with these airflow conditions, the LSI Nytro WarpDrive card temperature sensor is expected to limit at the following set points.
  - 70/30 random read/random writes and 100 percent entropy: 63.9 °C with card inlet at 45°
  - 100 percent sequential 256-kB writes and 100 percent entropy: 73.5 °C with card inlet at 45°

The LSI Nytro WarpDrive card is designed for a storage and transit environment defined by the following parameters.

- Temperature range: –20 °C to +75 °C (dry bulb)
- Relative humidity range: 5 percent to 95 percent noncondensing

NOTE Because of system design and cooling capacity variations that affect the actual airflow delivered to the LSI Nytro WarpDrive card, the system-level fan speeds might require adjustments to make sure the LSI Nytro WarpDrive card sensor temperature does not exceed 74 °C.

3.7 Safety Characteristics

All LSI PCIe boards meet or exceed the requirements of UL flammability rating 94V-0. Each bare board is marked with the supplier's name or trademark, type, and UL flammability rating. Because these boards are installed in a PCIe bus slot, all voltages are below the SELV 42.4-V limit.

3.8 LSI KnowledgeBase

The LSI KnowledgeBase website provides resources for customers. It includes articles on performance tuning and troubleshooting. For KnowledgeBase website information, go to:

http://mycusthelp.info/LSI/_cs/FindAnswers.aspx

3.9 Technical Support

For assistance installing, configuring, or running the LSI Nytro WarpDrive card, contact LSI Technical Support:

E-mail: support@lsi.com

Phone: 1-800-633-4545 (North America)
+00-800-5745-6442 (International)

Website: www.lsi.com/support

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